

WHAT IS CLAIMED IS:

1. A magnetically actuated motion control device, comprising a first housing member defining a cavity, said first housing member including a movable finger, a
5 second member positioned within said first housing member cavity, said first housing member movable relative to said second member, and a magnetic field generator located on said second member, said magnetic field generator causing said movable finger to press against said second member to produce frictional damping.
- 10 2. The magnetically actuated motion control device of claim 1, wherein said second member has a center axis, said second member and said first housing being relatively rotatable around said center axis.
3. The magnetically actuated motion control device of claim 1, wherein said first
15 housing member includes an opening, and wherein said movable finger extends through said first housing member opening.
4. The magnetically actuated motion control device of claim 2, wherein said housing encircles said second member, said housing relatively rotatable around said second
20 member.
5. The magnetically actuated motion control device of claim 2, wherein said housing encircles said second member, said second member relatively rotatable within said
25 housing.
6. The magnetically actuated motion control device of claim 1, said device having a central axis with said first housing member and said second member relatively rotatable around the central axis.
- 30 7. The magnetically actuated motion control device of claim 1, wherein said movable finger has a free end.

8. A device according to Claim 1, wherein said first housing member includes a first slot.

5 9. A device according to Claim 8, said movable finger having a tab end, said tab end extending through said first slot.

10. A device according to Claim 9, wherein said movable finger has a second tab end, said second tab end extending through said first slot.

10 11. The magnetically actuated motion control device according to Claim 1 wherein said movable finger encircles said second member.

12. The magnetically actuated motion control device according to Claim 1 wherein said movable finger is comprised of a circular band with a plurality of flex links.

15 13. The magnetically actuated motion control device according to Claim 1 with a gap between said movable finger and said second member when a magnetic field is not generated by said magnetic field generator.

20 14. The magnetically actuated motion control device according to Claim 1, wherein said first housing member is comprised of an outer perimeter and an inner shaft, with said second member received in a cavity between said outer perimeter and said inner shaft.

25 15. The magnetically actuated motion control device according to Claim 1, wherein said first housing member is comprised of an inner shaft, with said second member received in a cavity between said finger and said inner shaft.

16. The magnetically actuated motion control device of claim 15 wherein said first housing member inner shaft is separated from said second member with a bearing.

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17. The magnetically actuated motion control device of claim 16 wherein said second member is comprised of a stator having a center axis, said stator including a bobbin and a coil.

5 18. The magnetically actuated motion control device of claim 1, wherein said second member has an outer surface and the movable finger has an inner surface and wherein the device further comprises a friction increasing material between said outer surface and said inner surface.

10 19. The magnetically actuated motion control device of claim 1, wherein a lubricant is provided between said second member and the housing.

20. The magnetically actuated motion control device of claim 1, wherein the magnetic field generator includes at least one coil.

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21. The magnetically actuated motion control device of claim 20, further comprising a second coil spaced from the first coil.

20 22. The magnetically actuated motion control device of claim 1 wherein said movable finger comprises a circular band, said circular band substantially encircling an outer circumference of said second member.

23. The magnetically actuated motion control device of claim 1, wherein said second member is comprised of a circular stator having an outer circumference

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24. The magnetically actuated motion control device of claim 23, wherein said first housing member includes a shaft, and said circular stator is separated from said shaft with a bearing.

30 25. The magnetically actuated motion control device of claim 1, further comprising:

a sensor positioned to sense a dynamic characteristic of one of the first housing member and the second member relative to the other of the first housing member and the second member.

5 26. The magnetically actuated motion control device of claim 1, further comprising:
a sensor positioned to sense a positional characteristic of one of the first housing member
and the second member relative to the other of the first housing member and the second
member.

10 27. A magnetically actuated motion control device, comprising:
a first housing member including a cavity formed therein and including a movable
finger;
a second member disposed in the cavity; and
at least one magnetic field generator mounted to cause said movable finger to be
15 displaced toward said second member and thereby squeeze said second member.

28. The magnetically actuated motion control device according to Claim 27, wherein
said first housing member is comprised of an outer perimeter and an inner shaft, with said
second member received in a cavity between said outer perimeter and said inner shaft.
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29. The magnetically actuated motion control device according to Claim 27, wherein
said first housing member is comprised of an inner shaft, with said second member
received in a cavity between said finger and said inner shaft.

25 30. The magnetically actuated motion control device of claim 29 wherein said first
housing member inner shaft is separated from said second member with a bearing.

31. The magnetically actuated motion control device of claim 27 wherein said second
member is comprised of a stator having a center axis, said stator including a bobbin and a
30 coil.

32. The magnetically actuated motion control device of claim 27, wherein said second member is comprised of a circular stator having an outer circumference.

33. The magnetically actuated motion control device of claim 32, wherein said
5 movable finger is comprised of a circular band.

34. A method of controlling relative motion between a housing having a finger and a second member, said second member and said housing relatively movable, the housing defining a cavity in which the second member is located, the method comprising the steps
10 of:

generating a magnetic field and
pressing said finger against the second member in accordance with said generated magnetic field.

15 35. A method as claimed in claim 34, wherein said second member is a circular stator including a bobbin and a coil and said finger is magnetically permeable, wherein generating a magnetic field includes supplying a current from a current source to said coil to attract said finger towards said circular stator.

20 36. A method as claimed in claim 35, said method including rotating said circular stator relative to said housing.

37. A method as claimed in claim 36, wherein pressing said finger against said second member includes collapsing said finger around said circular stator.

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38. A system comprising:
a wheel connected to a shaft;
a first magnetically actuated motion control device according to claim 2 coupled to the shaft, one of the stator or the housing being rotatable relative to the shaft.

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39. The system according to claim 38, further comprising:

a second magnetically actuated motion control device according to claim 2, the second magnetically actuated motion control device being coupled to the shaft opposite the first magnetically actuated motion control device according to claim 2; and

a motor being coupled to the housing of the first magnetically actuated motion control device and to the housing of the second magnetically actuated motion control device such that as the motor turns the housing of the first magnetically actuated motion control device and the housing of the second magnetically actuated motion control device in opposite directions.

40. A system comprising:

a vehicle including a body and a door, the door being attached by a hinge to the body; and

a magnetically actuated motion control device according to claim 1 mounted between the door and the body to magnetically control a movement of the door relative to said body.

41. The system as claimed in claim 40 wherein said second member is a stator having a center axis, said stator and said first housing being relatively rotatable around said center axis

42. The system as claimed in claim 40, wherein said first housing member includes an opening, and wherein said movable finger extends through said first housing member opening.

43. The system as claimed in claim 40 wherein said first housing member is comprised of an outer perimeter and an inner shaft, with said second member received in a cavity between said outer perimeter and said inner shaft.

44. The system as claimed in claim 43 wherein said first housing member inner shaft is separated from said second member with a bearing.

45. The system as claimed in claim 40 wherein said second member is comprised of a stator having a center axis, said stator including a bobbin and a coil.

46. The system as claimed in claim 40 wherein said movable finger comprises a
5 circular band, said circular band substantially encircling an outer circumference of said second member.

47. The system as claimed in claim 40 wherein said second member is comprised of a circular stator having an outer circumference.

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48. The magnetically actuated motion control device as claimed in claim 1 wherein the device is a damper.

49. The magnetically actuated motion control device as claimed in claim 1 wherein
15 the device is a brake.

50. The magnetically actuated motion control device as claimed in claim 1 wherein the device is a lock.

20 51. A system comprising:

a vehicle including a body and a door, the door being attached by a hinge to the body; and

a magnetically actuated motion control device comprising a first housing member defining a cavity, said first housing member including a movable finger, a second
25 member positioned within said first housing member cavity, said second member movable relative to said first housing member, said second member including a magnetic field generator, said magnetic field generator causing said movable finger to press against said second member to produce frictional damping with said magnetically actuated motion control device mounted to control a positioning of the door relative to said body.

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52. The system as claimed in claim 51, wherein said movable finger is a circular band that encircles said second member.

53. The system as claimed in claim 51, wherein said second member is comprised of a stator having a center axis, said stator including a bobbin and a coil.

5 54. The system as claimed in claim 51, wherein said second member is comprised of a circular stator having an outer circumference.

55. A system comprising:

10 a body frame and a door, the door being attached by a hinge to the body frame;
and a magnetically actuated motion control device comprising a first housing member defining a cavity, said first housing member including a movable finger, a second member positioned within said first housing member cavity, said second member movable relative to said first housing member, said second member including a magnetic field generator, said magnetic field generator causing said movable finger to press against
15 said second member to produce frictional damping with said magnetically actuated motion control device mounted to control a positioning of the door relative to said body frame.

20 56. A magnetically actuated rotary motion control device, comprising:
a first housing member including a cavity formed therein and including a movable finger with a plurality of flex links;
a second member disposed in the cavity; and
at least one magnetic field generator mounted to cause said movable finger to be
25 displaced toward said second member and thereby squeeze said second member.

57. A magnetically actuated motion control device as claimed in claim 56, said movable finger comprised of a circular band.

30 58. A magnetically actuated motion control device as claimed in claim 56, said second member comprised of a stator having an outer circumference, and said movable finger encircles at least seventy percent of said second member stator outer circumference.

59. A magnetically actuated rotary motion control device, comprising:
a first housing member including a cavity formed therein and including a movable
finger;

5 a second member disposed in the cavity, said second member having an outer
circumference, with said movable finger encircling at least seventy percent of said second
member outer circumference; and
at least one magnetic field generator mounted to cause said movable finger to be
displaced toward said second member and thereby squeeze said second member.

10 60. A magnetically actuated motion control device as claimed in claim 59, said movable
finger comprised of a circular band.

15 61. A magnetically actuated motion control device as claimed in claim 59, said movable
finger having a plurality of flex links.

62. A magnetically actuated motion control device as claimed in claim 59, said movable
finger encircling at least eighty percent of said second member outer circumference.

20 63. A magnetically actuated motion control device as claimed in claim 59, said movable
finger encircling at least ninety percent of said second member outer circumference.

64. A magnetically actuated motion control device as claimed in claim 59, said movable
finger encircling at least ninety five percent of said second member outer circumference.

25 65. A system comprising:
a control knob, said control knob including a movable finger,
a base with said control knob rotatable relative to said base,
a sensor positioned to sense a positional characteristic of said rotatable control knob
30 relative to said base,

said base including a stator for generating a magnetic field to cause said movable finger to press against said base to produce frictional damping to inhibit rotation of said control knob.

5 66. A system as claimed in claim 65 wherein said stator generates said magnetic field based on a positional characteristic sensed by said sensor.

67. A system as claimed in claim 65 wherein said sensor is comprised of an optical encoder.

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68. A system as claimed in claim 65 wherein said movable finger is comprised of a circular band.

69. A magnetically actuated rotary motion control device, comprising:
15 a first housing member including a cavity formed therein and including a movable finger;
 a second member disposed in the cavity, said second member including a permanent magnet, said permanent magnet generating an attractive magnetic field for attracting said movable finger into frictional contact with said second member to inhibit
20 rotation between said first member and said second member.

70. A magnetically actuated rotary motion control device as claimed in claim 69 including a magnetic field generating coil, said magnetic field generating coil generating
25 a coil magnetic field that cancels the permanent magnet attractive magnetic field.